

Research Paper: Use and Impact of Social Networks on Physical Medicine and Rehabilitation Scientific Journals



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ABSTRACT

Objectives: Our research seeks to examine the correlation between the presence of physical medicine and rehabilitation journals in social networks and the SJR impact factor.

Methods: We carried out a correlation study. For the research, we took into account all physical medicine and rehabilitation journals included in the SCImago Journal Rank. The number of followers on Twitter, Facebook, YouTube, and the number of tweets were extracted from verified accounts. Journal differences according to the presence in social networks were evaluated using non-parametric tests, and the Spearman correlation coefficient was calculated between the metrics of dissemination in social networks and the SCImago Journal Rank.

Results: Out of 122 physical medicine and rehabilitation journals, 25.4% had the presence in one social network. The H Index medians (32 vs 17, $P=0.014$) and of the SJR (0.67 vs 0.32, $P=0.001$) were better in journals with the presence in social networks. A moderate correlation was found between the SJR and the number of followers on Twitter ($r=0.5$, $P=0.066$). The global correlation between the SJR and followers on Facebook was acceptable ($r=0.4$, $P=0.1205$).

Discussion: Our data show that scientific journals of physical medicine and rehabilitation with presence in social networks have superior quality metrics. Additionally, SJR and the indicators of dissemination in social networks are moderately correlated. Both metrics offer complementary information. Presence in social networks could improve the visibility of journals and their interaction with readers.

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Highlights

- The medians of the H Index and the SJR were significantly higher as compared with the journals without social networks in physical medicine and rehabilitation journals with social networks.
- Among the analyzed social networks, the most commonly used was Facebook followed by Twitter.
- There is a moderate correlation between the SJR and the number of followers in Twitter.

Plain Language Summary

Our research seeks to evaluate the dissemination of information by scientific journals of physical medicine and rehabilitation. We evaluated the correlation between the presence of physical medicine and rehabilitation journals in social networks through indicators of social networks activity (number of followers, number of tweets) and the SJR impact factor (numeric value indicating the number of citations per year per manuscript published in a journal during the previous 3 years). Out of the 122 physical medicine and rehabilitation journals reviewed in the SCImago ranking platform, 25.4% were active at least in one social network. Among the analyzed social networks, the most commonly used was Facebook followed by Twitter. The H Index and SJR medians were significantly better in journals with the presence in social networks and the group of journals with social networks was more frequently classified in the Q1 quartile. Our data suggest that social networks facilitate access to information in real time reaching a wider audience. We found that having social networks is associated with a greater impact on scientific journals of physical medicine and rehabilitation. We consider social networks an opportunity for many journals to expand their scope, improve their visibility and interaction with readers, and finally, social networks can provide to the authors a tool to select the best journal to widely diffuse their research results.

1. Introduction

Traditionally, the impact on biomedical research has been evaluated through the assessment of the impact factor. The impact factor is an index derived from the frequency at which the articles published in a scientific journal are cited [1], determining its relevance within the scientific field. Despite its traditional use, this evaluation system has been criticized lately, due to the long process it takes for biomedical research papers to be written, reviewed, and published. Also, it has some limitations for its diffusion, since they have a very selective target audience [2].

The growing evolution of communication, which has been generated through the development of the Internet and social networks, has evolved toward new ways to determine the impact of biomedical research studies [2]. The latter can complement traditional evaluation, and overcome some of its limitations by providing real-time measures and expanding the scope of the audience they are directed to. In this way, the concept of “altmetrics” (alternative metrics), introduced in 2010, has become a non-traditional option for measuring the impact of scientific publications in the general public, based on the

number of “mentions” that an article has had in social networks such as Facebook, Twitter, and YouTube [3]. A similar approach can be used to measure the impact of medical journals among a broader audience.

Our research seeks to establish if the activity of physical medicine and rehabilitation journals in social networks is correlated to the SJR impact factor, a commonly-used metric of impact based on the number of citations, and to determine if both offer the same or complementary information.

2. Methods

We carried out a correlation study to compare the SJR (SCImago Journal Rank indicator) with the alternative metrics based on the activity of scientific journals on physical medicine and rehabilitation in social networks. We identified the physical medicine and rehabilitation journals included in the portal of the SCImago Country and journal Ranking [4]. It bases its calculations on the citations that appear on the Scopus portal developed by Elsevier [4]. In this study, we included all the journals in the thematic area “Medicine” and “rehabilitation.” The Institutional Ethics Committee approved the study.

From the SCImago electronic portal [4], the following variables were collected: the SJR, which was taken as an approximation to the scientific quality of the journal; the H index, the total number of documents published in the last 3 years (results were adjusted for years since the creation of the accounts), and open access option availability. We classified the regions according to the country of publication of the journal into the following categories: North America, Latin America, Europe, Asia, Oceania, and Africa.

Regarding the use of social networks, Facebook, Twitter, YouTube, and Instagram were consulted. Only journals that had an exclusive social network for publication were included for analysis (journals with social networks belonging to scientific societies or publishers were not included). In Facebook, the number of followers in the “community” section was consulted and the creation dates of each account were taken from the “information” section. For Twitter, the number of followers, the number of tweets, and the date the account was created were taken from the main page. In YouTube, data were taken from the home page; the number of videos was taken from the “videos section” and the number of views (total and most viewed video) was collected from each video. The search was carried out during the fourth week of March 2019, in the shortest time possible to reduce the risk of bias, caused by the rapidly changing nature of alternative metrics.

The SJR is a traditional measure based on the number of citations in the previous 3 years, adjusted for the quality of the journal where citations appeared, and for the number of self-citations [4]. The H index (Hirsch index) evaluates the number of articles (h) that had been cited at least h times, in such a way that it allows quantifying the productivity of the journal and the scientific impact of the publications [4]. The quartile is determined from the position of a journal in relation to others in its area, ordering it from the most to the least impact.

To evaluate the data distribution, the Shapiro-Wilk test was used. After demonstrating a non-normal distribution, we used nonparametric statistics. The Mann-Whitney U test was used to evaluate the differences between journals with and without social networks and analyze their possible significant differences between them. The correlation between the metrics of presence in social networks and the SJR was evaluated using the Spearman correlation coefficient. The statistical significance was defined at 0.05. Stata 14 was used as the statistical program for the analysis. The study was approved by the Institutional Ethics Committee.

3. Results

Out of the 122 physical medicine and rehabilitation journals reviewed in the SCImago Ranking platform, 31 (25.4%) had a social network. In these 31 journals, the medians of the H Index (32 vs 17, $P=0.01$) and the SJR (0.67 vs 0.32, $P=0.001$) were significantly better than those from journals without social networks. Furthermore, More journals with social networks were classified in the Q1 quartile ($P=0.007$) (Table 1).

Among the analyzed social networks, the most commonly used was Facebook with 16.4%, followed by Twitter with 14.7%. Only two journals had a YouTube account (Journal of Rehabilitation Research and Development and American Journal of Physical Medicine and Rehabilitation) and none used Instagram. Of the journals that used Twitter as a social network, half (50%) had more than 500 followers and more than 500 Tweets (Table 2). Journals with the presence in Twitter or Facebook and the SJR impact factor are presented in supplementary Table 1.

A moderate correlation between the SJR and the number of followers on Twitter was found ($r=0.5$, $P=0.07$) and the global correlation with Facebook was acceptable ($r=0.4$, $P=0.12$). Regarding the number of Tweets, the correlation was low and did not reach statistical significance ($r=0.3$, $P=0.29$). The correlation did not change significantly when journal accounts had a longer time of presence in social networks. The correlation between the SJR and the number of followers in Twitter and Facebook was better for European journals ($r=0.8$, $P=0.003$ and $r=0.9$, $P=0.0048$, respectively) than for journals published in North America (Tables 3 and 4).

4. Discussion

The results of our research show that scientific journals of physical medicine and rehabilitation with the presence in social networks have a significantly higher H index and SJR impact factor than other journals, and most are contained within the Q1. Additionally, we found a moderate correlation between the metrics of dissemination in social networks and the SJR impact factor.

The differences between journals according to the presence of social networks have already been evaluated in other areas of medicine such as radiology and orthopedics [5, 6]. Their findings are similar to ours showing a greater impact factor for journals with social networks. This finding could suggest that social networks help diffuse scientific information, improve their impact, expand their audience, and promote the number of readers.

Table 1. The characteristics of the study sample according to their presence in social networks their

Variables	No. (%)		P	
	Journals With Social Network n=31	Journals Without Social Network n=91		
H Index [†] (median, IQR [‡])	32 (16-66)	17 (8-39)	0.014	
SJR [§] (median, IQR)	0.7 (0.32-0.82)	0.3 (0.14-0.57)	0.001	
Quartile	Q1	14 (45.2)	17 (18.7)	0.007
	Q2	9 (29.0)	21 (23.1)	
	Q3	5 (16.1)	25 (27.5)	
	Q4	3 (9.7)	28 (30.8)	
Region	Europe	12 (38.7)	57 (62.6)	0.177
	North America	16 (51.6)	27 (29.7)	
	Asia	1 (3.2)	4 (4.4)	
	Latin America	1 (3.2)	2 (2.2)	
	Africa	1 (3.2)	1 (1.1)	
	Oceania	0 (0)	0 (0)	
Open Access	7 (22.6)	24 (26.4)	0.162	
Number of published articles in the last 3 years	0-74	8 (25.8)	28 (30.8)	0.24
	75-199	11 (35.5)	42 (46.2)	
	> 200	12 (38.7)	21 (23.1)	

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Compared through non-parametric Mann-Whitney U test; [†]IQR: Interquartile range; [§]SJR: SCImago Journal Rank

Table 2. Description of activity in social networks

Social Network	No. (%)		
Twitter	Presence in Twitter	18 (14.8)	
		<500	9 (50)
	Number of followers	500-2000	6 (33.3)
		>2000	3 (16.7)
		<500	9 (50)
	Number of Tweets	500-2000	6 (33.3)
		>2000	3 (16.7)
	Followers/ year, median (RIQ)*	135.28 (41.5 - 432)	
Facebook	Presence in Facebook	20 (16.4)	
	The median number of followers, (IQR)	1860 (582 - 2755)	
	Followers/year, median (IQR [†])	226.7 (145.5 - 344.4)	
YouTube	Presence in YouTube	2 (1.6)	
Instagram	Presence in Instagram	0 (0)	

IQR: Interquartile range

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Table 3. The correlation between different alternative metrics in Twitter and the SJR

Twitter (n=18)		Number of Followers	Number of Followers/ Year	Number of Tweets
Global correlation		0.5	0.4	0.3
Open access (n=3)		NE†	NE	NE
No open access (n=15)		0.7	0.4	0.4
Q1-Q2 (n=14)		0.4	0	0.4
Q3-Q4 (n=4)		NE	NE	NE
Regions	Europe (n=9)	0.8*	0.8	0.6
	North America (n=8)	0.6	0.3	0.4
	Africa (n=1)	NE	NE	NE
Number of publications in 3 years	<200 (n=8)	0.5	0.2	0.3
	>200 (n=10)	0.2	0.4	-0.2

*Statistical significance was set at 0.05; NE: Not Evaluable

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Table 4. The correlation between the SJR and different alternative metrics on Facebook

Facebook (n=20)		Number of Followers	Number of Followers/ Year
Global correlation (n=20)		0.4	0.3
Open Access (n=15)		0.4	0.3
No open access (n=5)		0	0
Q1-Q2 (n=14)		0.5	0.3
Q3-Q4 (n=6)		0.3	0.08
Regions	Europe (n=7)	1	0.9*
	North America (n=11)	0.3	0.2
	Latin America (n=1)	NE†	NE
	Asia (n=1)	NE	NE
Number of publications in 3 years	<200 (n=13)	0.5	0.5
	>200 (n=7)	0.4	0.2

*Statistical significance set at 0.05; †NE: Not Evaluable

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However, it could also suggest that journals that have social networks are the ones that publish the most popular studies. Further research is required to evaluate the direction of causality.

Our results demonstrate that the most used social network was Facebook, with 20 journals and a median of 1.860 followers, which shows its high activity. The journal with the highest activity in Facebook was the Journal of Neurologic Physical Therapy with 6.849 followers

and an SJR impact factor of 1.227. The journal with the highest activity in Twitter was the Archives of Physical Medicine and Rehabilitation with 2.862 followers, 3.258 number of tweets, and an SJR impact factor of 1.501.

More information can be found in supplementary Table 1. The fact that the most used social network was Facebook is striking because, in other areas of knowledge, Twitter is the most frequently used social network [7]. This finding may be because Facebook is a social network

that allows greater interaction among its participants and in this case allows a high communication between health care workers and their patients, which is necessary to facilitate the process of rehabilitation and care.

Our data suggest a direct correlation between the SJR impact factor and social networks. Studies carried out in other scientific areas have reported similar findings, in emergency medicine publications, a positive correlation was found between the number of citations and alternative metrics for measuring the impact factor [9]. Moreover, scientific publications of otolaryngology [10] have demonstrated the potential of social networks for sharing search, increasing the number of readers, and promoting discussions regarding scientific articles. These data suggest that the information provided by both kinds of metrics is complementary.

Two limitations in the development of our study must be taken into account. The first limitation is that the information disclosed by our research is dynamic and susceptible to changes, due to constant updates occurring in social networks. However, this reflects the interest for publications to arise in real-time in a certain journal. The second limitation is the low number of journals in the area of physical medicine and rehabilitation, which limits the statistical power of the study for determining correlation. However, our findings include the entire journal indexed within the SCImago Ranking platform. Therefore, it is not possible to increase the sample size.

Besides, the fact that our results are consistent with those obtained in other areas of medicine suggests that the correlation between the metrics is likely. However, this is the first study that evaluates the correlation between SJR impact factor and alternative metrics in physical medicine and rehabilitation journals. Previous studies in the area have evaluated the correlation between alternative and conventional metrics in individual studies rather than journals, highlighting that the importance of alternative metrics is increasing and the field of physical medicine and rehabilitation can benefit from their use, also concluding that both metrics might synergistically complement each other [8]. In addition to our strengths, data collection was performed in the shortest time possible (24 hours), taking into account the rapid variability of information contained within social networks.

5. Conclusion

Our research contributes to the evaluation of the dissemination of information by scientific journals of physical medicine and rehabilitation, through indicators of social

networks activity and their association with the SJR impact factor. Our data suggest that social networks facilitate access to information in real time reaching a wider audience. We found that having social networks is associated with a greater impact on scientific journals of physical medicine and rehabilitation, so we consider that social networks are an opportunity for many journals to expand their scope, improve their visibility, and interact with readers. Finally, social networks provide the authors with a tool to select the best journal to widely diffuse their research results.

Ethical Considerations

Compliance with ethical guidelines

The Institutional Ethics Committee approved the study.

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Authors' contributions

Conceptualization: Daniel G. Fernandez-Ávila, Carolina Mancipe-García; Methodology: Daniel G. Fernandez-Ávila, Oscar Muñoz-Velandia, Ángel García; Investigation, writing: Daniela Cerón-Perdomo, Carolina Mancipe-García, Oscar Muñoz-Velandia; Review & editing: All authors.

Conflict of interest

The authors declared no conflict of interest.

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